

# MODEL QUESTION PAPER FOR SUMMATIVE ASSESSMENT

## I P.U.C PHYSICS (33)

Time : 3 hours 15 minutes

Max Marks : 70

### General instructions :

- 1) All parts are compulsory.
- 2) Draw relevant diagram/figure wherever necessary.
- 3) Numerical problems should be solved with relevant formulae.

### PART – A

I Answer any NINE of the following questions 9x1=9

1. Name any one fundamental force in nature.
2. What is the minimum number of vectors to give zero resultant?
3. Which law of motion is used to explain rocket propulsion?
4. What is the value of One kilowatt hour (kwh) in joules?
5. How does acceleration due to gravity change with increasing altitude?
6. How does the escape speed of a body from the earth depends on height of the location from where the body is launched?
7. State Hooke's law.
8. What is the average interatomic distance between atoms in water?
9. Define degrees of freedom of a molecule.
10. Give an example for a non simple harmonic periodic motion.
11. A man with a wrist watch on his hand falls from the top of a tower. How does the watch show time during the free fall?

### PART – B

II Answer any FIVE of the following questions. 5x2=10

12. Name two Physicists who achieved in unification of electricity and magnetism.
13. Mention any two uses of dimensional analysis.
14. A player throws a ball upwards with an initial speed of  $29.4 \text{ ms}^{-1}$ . What is the direction of acceleration during upward motion? Find its velocity at the highest point of its motion.
15. Give an expression for total energy of circularly orbiting satellite and explain the terms.
16. Explain elastic behaviour of solids.
17. Distinguish between isothermal and adiabatic processes.
18. Show that specific heat of solids,  $C=3R$ .

## PART – C

**III Answer any FOUR of the following Questions. 4x4=16**

19. Derive an expression for centripetal acceleration.
20. State Newton's second law of motion and hence derive  $F = ma$ .
21. Prove that change in kinetic energy of a particle is equal to the work done on it by a variable force.
22. Arrive at the expression for escape speed of the body from the surface of earth.
23. Explain how Pascal's law is applied in a hydraulic lift.
24. Give any four differences between progressive and stationary waves.

**OR**

Explain how a stationary wave forms in a closed pipe. Compare the first three harmonics produced in it.

## PART – D

**IV Answer any FOUR of the following Questions 4x5=20**

25. What is a V-t graph? Derive  $x = V_0 t + \frac{1}{2} a t^2$  using V-t graph.
26. Derive an expression for potential energy of a spring and show that spring force is a conservative force.
27. (a) Derive moment of inertia of a rigid body.  
(b) State and explain theorems of perpendicular axes and parallel axes.

**OR**

- a) What is centre of mass of a body.
- b) Obtain an expression for the position vector of a centre of mass of two particle system.
28. (a) Explain the variation of temperature with heat (energy) for water at one atmosphere with a graph.  
(b) Define latent heat of fusion and latent heat of vapourisation.
29. What are beats? Give the theory of beats.
30. What is a heat engine? Explain its working principle and define its efficiency.

## PART– E

**V Answer any THREE of the following. 3x5=15**

31. A cricket ball is thrown at a speed of  $56 \text{ ms}^{-1}$  in a direction, making an angle  $30^\circ$  with the horizontal. Calculate
  - a) maximum height,
  - b) total time taken by the ball to return to the earth and
  - c) the distance from thrower to the point where the ball returns to the earth.

32. A bullet of mass 0.04 kg moving with a speed of  $60\text{ ms}^{-1}$  enters heavy wooden block and is stopped after a distance of 60 cm. What is the average resistive force exerted by the block on the bullet?
33. A bullet of mass 10 g and speed  $500\text{ ms}^{-1}$  is fired into a door get embedded exactly at the centre of the door. The door is 1.0 m wide and weighs 12 kg. It is hinged at one end and rotates about vertical axis practically without friction. Find the angular speed of the door just after the bullet embeds into it.
34. A thermocole ice box is a cheap and efficient method for storing small quantities of cooked food in summer in particular. A cubical ice box of side 30 cm has a thickness of 5 cm. If 4.0 kg of ice is put in the box, estimate the amount of ice remaining after 6 hrs. The outside temperature is  $45^{\circ}\text{C}$  and co-efficient of thermal conductivity of thermocole is  $0.01\text{ js}^{-1}\text{ m}^{-1}\text{ k}^{-1}$ .  
[Heat of fusion of water =  $335 \times 10^3\text{ J kg}^{-1}$ ]
35. A train standing at the outer signal of a railway station blows a whistle of frequency 400Hz in still air.
- (i) what is the frequency of whistle for a platform observer when the train
- (a) approaches the platform with speed of  $10\text{ ms}^{-1}$
- (b) recedes from the platform with the speed of  $10\text{ ms}^{-1}$
- (ii) what is the speed of sound in each case.  
[The speed of sound in still air =  $340\text{ ms}^{-1}$ ]

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